

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently amended) A three dimensional printing composition, comprising:
a dry, loose, free-flowing particulate material including:
about 10% to about 50% by weight of a particulate water-soluble adhesive material;
0% to about 20% by weight of a first fibrous component;
semihydrate of calcium sulfate;
an accelerator; and
a filler,
further characterized by absence of a retardant
wherein the particulate material comprises particles having ~~has a mean particle size between~~
diameter of about 10 microns ~~[[and]]to~~ about 100 microns, and is suitable for use in three dimensional
printing to form an article comprised of a plurality of layers, the layers including a reaction product of
the particulate material and a aqueous fluid that contacts the particulate material during three
dimensional printing, the particulate material being capable of supporting the article during three
dimensional printing and suitable for being spread in a layer of dry particles having a thickness selected
from a range of about 12 to about 125 microns.
2. (Original) The three dimensional printing composition of claim 1, further comprising from about
0% to about 30 % of a second fibrous component.
3. (Original) The three dimensional printing composition of claim 1, further comprising about 0 to
about 3 percent, by weight of the total composition, of a printing aid.
4. (Previously presented) The three dimensional printing composition of claim 3, wherein the printing
aid is selected from the group consisting of lecithin, hydrophilic lecithin, polypropylene glycol,
citronellol, and combinations thereof.
5. (Cancelled)

6. (Previously presented) The three dimensional printing composition of claim 1, wherein the particulate adhesive material has an average particle grain size between about 10 and about 20 microns.
7. (Previously presented) The three dimensional printing composition of claim 1, wherein the particulate adhesive material is a polymer.
8. (Cancelled)
9. (Cancelled)
10. (Previously presented) The three dimensional printing composition of claim 1 or 7, wherein the polymer is selected from the group consisting of polyethylene glycol, sodium polyacrylate, polyvinyl alcohol, polyvinyl pyrrolidone, sodium polyacrylate copolymer with maleic acid, polyvinyl pyrrolidone copolymer with vinyl acetate, and combinations thereof.
11. (Previously presented) The three dimensional printing composition of claim 1, wherein the particulate adhesive material is a carbohydrate.
12. (Previously presented) The three dimensional printing composition of claim 1, wherein the filler further comprises a carbohydrate.
13. (Original) The three dimensional printing composition of claim 11 or 12, wherein the carbohydrate is selected from the group consisting of acacia gum, locust bean gum, sodium carboxy methylcellulose, sodium alginate, hydroxypropyl cellulose, dextrin, maltodextrin, cellulose gel, starch, sugar, and combinations thereof.
14. (Original) The three dimensional printing composition of claim 11 or 12, wherein the carbohydrate is a starch selected from the group consisting of: pregelatinized starch, acid-modified starch, and hydrolyzed starch.

15. (Original) The three dimensional printing composition of claim 11 or 12, wherein the carbohydrate is a sugar or a sugar alcohol selected from the group consisting of sucrose, dextrose, fructose, lactose, polydextrose, sorbitol, xylitol, and combinations thereof.

16. (Cancelled)

17. (Cancelled)

18. (Previously presented) The three dimensional printing composition of claim 1, wherein the particulate adhesive material is an organic acid.

19. (Previously presented) The three dimensional printing composition of claim 1, wherein filler further comprises an organic acid.

20. (Cancelled)

21. (Original) The three dimensional printing composition of claim 18 or 19, wherein the organic acid is selected from the group consisting of citric acid, succinic acid, polyacrylic acid, and combinations thereof.

22. (Previously presented) The three dimensional printing composition of claim 1, wherein the particulate adhesive material is an inorganic compound.

23. (Previously presented) The three dimensional printing composition of claim 1, wherein the filler further comprises an inorganic compound.

24. (Previously presented) The three dimensional printing composition of claim 22 or 23, wherein the inorganic compound is selected from the group consisting of bentonite, sodium silicate, salt, and combinations thereof.

25. (Cancelled)

26. (Original) The three dimensional printing composition of claim 1, wherein the fibrous component has a length of about 60 microns to about 200 microns.

27. (Original) The three dimensional printing composition of claim 26, wherein the fibrous component is a polymeric fiber.

28. (Original) The three dimensional printing composition of claim 27, wherein the polymeric fiber is selected from the group consisting of: cellulose fiber, cellulose derivative fiber, ceramic fiber, graphite fiber, and fiberglass.

29. (Original) The three dimensional printing composition of claim 26, wherein the fibrous component is selected from the group consisting of : cellulose fiber, silicon carbide fiber, graphite fiber, aluminosilicate fiber, polypropylene fiber and fiberglass.

30. (Previously presented) The three dimensional printing composition of claim 2, wherein the second fibrous component has a length of about 30 microns to about 100 microns.

31. (Currently amended) A three dimensional printing composition comprising:

a dry, loose, free-flowing particulate material including:

about 10% to about 50% by weight of an adhesive material;

0% to about 20% by weight of a first fibrous component;

semihydrate of calcium sulfate; and

0% to about 80% by weight of a filler,

wherein the adhesive material comprises a polyvinyl pyrrolidone copolymer with vinyl acetate, the adhesive material has an average particle grain size between about 10 and about 20 microns, the filler has a mean particle size between about 20 and about 200 microns, the particulate material comprises particles having ~~[[has]]~~ a mean ~~particle size between~~ diameter of about 10 microns ~~[[and]]~~ to about 100 microns, and is suitable for use in three dimensional printing to form an article comprised of a plurality of layers, the layers including a reaction product of the particulate material and a aqueous fluid that contacts the particulate material during three dimensional printing, the particulate material being capable of supporting the article during three dimensional printing and suitable for being spread in a layer of dry particles.

32. (Cancelled)

33. (Original) The three dimensional printing composition of claim 1, wherein the adhesive material is about 30 percent, by weight, of the composition.

34. (Original) The three dimensional printing composition of claim 1, wherein the filler is about 60 percent, by weight, of the composition.

35. (Cancelled)

36. (Original) The three dimensional printing composition of claim 1, wherein the first fibrous component is about 10 percent, by weight, of the composition.

37. (Original) The three dimensional printing composition of claim 2, wherein the second fibrous component has a length less than half the length of the first fibrous component.

38. (Currently amended) A method of three dimensional printing, comprising:

providing a first layer of a three dimensional printing composition including a dry, loose, free-flowing particulate material including about 10% to about 50% by weight of a particulate adhesive material, 0% to about 20% by weight of a first fibrous component, and a filler comprising plaster, the

layer comprising dry particles and having a thickness selected from a range of about 12 to about 125 microns;

delivering an aqueous fluid to a portion of the first particulate material layer;

allowing the portion of the first particulate material layer to solidify;

providing a second layer of the three dimensional printing composition including the particulate material;

delivering the fluid to a portion of the second particulate material layer; and

allowing the portion of the second particulate material layer to solidify,

to form at least a portion of a solid article including a plurality of layers,

wherein the particulate material is capable of supporting the article during three dimensional printing.

39. (Currently amended) A three dimensional printing composition, comprising:

a dry, loose, free-flowing particulate material having a mean particle size between about 10 microns and about 300 microns, comprising

plaster,

an at least partially water soluble particulate adhesive material, and

a printing aid,

wherein the particulate adhesive material is up to about 50 percent, by weight, of the composition, and the particulate material is suitable for use in three dimensional printing to form an article comprised of a plurality of layers, the layers including a reaction product of the particulate material and an aqueous fluid that contacts the particulate material during three dimensional printing, the particulate material being capable of supporting the article during three dimensional printing and suitable for being spread in a layer of dry particles having a thickness selected from a range of about 12 to about 125 microns.

40. (Original) The three dimensional printing composition of claim 39, further comprising a filler.

41. (Original) The three dimensional printing composition of claim 40, wherein the filler is a

carbohydrate.

42. (Cancelled)

43. (Previously presented) The three dimensional printing composition of claim 39, wherein the printing aid is selected from the group consisting of: polyethylene glycol, sorbitan trioleate, sorbitan monooleate, ethylene glycol di-octyl-decyl ester, ethoxylated fatty-acid esters of sorbitan, glycerol, ethylene glycol and propylene glycol, polypropylene glycol, citronellol, and combinations thereof.

44. (Previously presented) The three dimensional printing composition of claim 39, wherein the at least partially water soluble adhesive is a starch.

45. (Original) The three dimensional printing composition of claim 40, wherein the filler is a starch.

46. (Previously presented) The three dimensional printing composition of claim 44 or 45, wherein the starch is selected from the group consisting of: pregelatinized starch, acid-modified starch, cationically modified starch, hydrolyzed starch, and combinations thereof.

47. (Original) The three dimensional printing composition of claim 44, further comprising a fiber.

48. (Previously presented) The three dimensional printing composition of claim 47, wherein the fiber is selected from the group consisting of: polymeric fiber, rayon fiber, ceramic fiber, graphite fiber, fiberglass, and combinations thereof.

49. (Previously presented) The three dimensional printing composition of claim 48, wherein the polymeric fiber is a material selected from the group consisting of: cellulose fiber, cellulose derivative fiber, a polymer derived from an alkyl monomer, a polymer derived from an alkene monomer of up to 8 carbon atoms, and combinations thereof.

50. (Currently amended) A three dimensional printing composition, comprising:

a dry, loose, free-flowing particulate material including:

 semihydrate of calcium sulfate;

 a first particulate adhesive is partially hydrolyzed polyvinyl alcohol;

 a second particulate adhesive; and

 an accelerator,

further characterized by absence of a retardant,

wherein the particulate material comprises particles having ~~[[has]]~~ a mean ~~particle size between~~ diameter of about 10 microns ~~[[and]]~~ to about 100 microns, and is suitable for use in three dimensional printing to form an article comprised of a plurality of layers, the layers including a reaction product of the particulate material and an aqueous fluid that contacts the particulate material during three dimensional printing, the particulate material being capable of supporting the article during three dimensional printing and suitable for being spread in a layer having a thickness selected from a range of about 12 to about 125 microns.

51. (Original) The three dimensional printing composition of claim 50, further comprising a filler.

52. (Previously presented) The three dimensional printing composition of claim 51, wherein the filler is selected from the group consisting of: silica, limestone, starch, and combinations thereof.

53. (Original) The three dimensional printing composition of claim 50, wherein the accelerator is selected from the group consisting of: terra alba, potassium sulfate, sodium chloride, undercalcined plaster, alum, potassium alum, lime, calcined lime, and combinations thereof.

54. (Cancelled)

55. (Cancelled)

56. (Cancelled)

57. (Previously presented) The three dimensional printing composition of claim 50, wherein the

second adhesive is Dextrin.

58. (Currently amended) A three dimensional printing composition comprising:

a dry, loose, free-flowing particulate material including:

semihydrate of calcium sulfate;

a first particulate adhesive;

a second particulate adhesive; and

an accelerator,

further characterized by absence of a retardant,

wherein the first adhesive is Dextrin and the particulate material comprises particles having ~~[[has]]~~ a mean ~~particle size between diameter of~~ about 10 microns ~~[[and]]~~ to about 100 microns, and is suitable for use in three dimensional printing to form an article comprised of a plurality of layers, the layers including a reaction product of the particulate material and an aqueous fluid that contacts the particulate material during three dimensional printing, the particulate material being capable of supporting the article during three dimensional printing and suitable for being spread in a layer of dry particles having a thickness selected from a range of about 12 microns to about 125 microns.

59. (Previously presented) The three dimensional printing composition of claim 50, wherein the second adhesive is Cellulose gel.

60. (Original) The three dimensional printing composition of claim 50, wherein the composition includes less than about 20 % of the accelerator by weight of the composition.

61. (Original) The three dimensional printing composition of claim 60, wherein the composition includes less than about 5 % of the accelerator by weight of the composition.

62. (Original) The three dimensional printing composition of claim 61, wherein the composition includes less than about 1 % of the accelerator by weight of the composition.

63. (Original) The three dimensional printing composition of claim 50, wherein the composition

includes about 60 to about 80% of plaster, by weight of the composition.

64. (Original) The three dimensional printing composition of claim 63, wherein the composition includes about 15 to about 30% of the first adhesive, by weight of the composition.

65. (Original) The three dimensional printing composition of claim 64, wherein the composition includes about 2 to about 10% of the second adhesive, by weight of the composition.

66. (Currently amende) A kit for three dimensional printing, comprising:

a three dimensional printing composition; and

an aqueous fluid comprising an accelerator,

wherein the three dimensional printing composition comprises a dry, loose, free-flowing particulate material including plaster and a first particulate adhesive, the particulate material is suitable for use in three dimensional printing to form an article comprised of a plurality of layers, the layers including a reaction product of the particulate material and the aqueous fluid that contacts the particulate material during three dimensional printing, the particulate material being capable of supporting the article during three dimensional printing and suitable for being spread in a layer of dry particles having a thickness selected from a range of about 12 to about 125 microns.

67. (Original) The kit of claim 66, wherein the three dimensional printing composition further includes a second adhesive.

68. (Original) The kit of claim 67, wherein the three dimensional printing composition further comprises an accelerator.

69. (Cancelled)

70. (Currently amended) A kit comprising:

a three dimensional printing composition; and

an aqueous fluid comprising a humectant,

wherein the three dimensional printing composition comprises a dry, loose, free-flowing particulate material including plaster and a first particulate adhesive, the particulate material is suitable for use in three dimensional printing to form an article comprised of a plurality of layers, the layers including a reaction product of the particulate material and the aqueous fluid that contacts the particulate material during three dimensional printing, the particulate material being capable of supporting the article during three dimensional printing and suitable for being spread in a layer of dry particles having a thickness selected from a range of about 12 to about 125 microns.

71. (Currently amended) A kit comprising:

- a three dimensional printing composition; and
- an aqueous fluid comprising a flow rate enhancer,

wherein the three dimensional printing composition comprises a dry, loose, free-flowing particulate material including plaster and a first particulate adhesive, the particulate material is suitable for use in three dimensional printing to form an article comprised of a plurality of layers, the layers including a reaction product of the particulate material and the aqueous fluid that contacts the particulate material during three dimensional printing, the particulate material being capable of supporting the article during three dimensional printing and suitable for being spread in a layer of dry particles having a thickness selected from a range of about 12 to about 125 microns.

72. (Previously presented) A three dimensional printing composition, comprising:

- a dry, loose, free-flowing particulate material including:

- plaster,
- a particulate adhesive,
- an accelerator,
- a filler, and
- an oil,

wherein the particulate material is suitable for use in three dimensional printing to form an article comprised of a plurality of layers, the layers including a reaction product of the particulate material and an aqueous fluid that contacts the particulate material during three dimensional printing.

73. (Previously presented) The three dimensional printing composition of claim 72, wherein the filler is selected from the group consisting of: silica, limestone, starch, glass beads, sand, rayon fiber, cellulose, limestone, zircon, olivine, staurolite, chromite, alumina, mullite, bohemite, kaolin, bentonite, and combinations thereof.

74. (Original) The three dimensional printing composition of claim 72, wherein the accelerator is selected from the group consisting of: terra alba, undercalcined plaster, alum, potassium alum, lime, calcined lime, barium sulfate, magnesium sulfate, zinc sulfate, calcium chloride, potassium sulfate, sodium sulfate, ammonium sulfate, calcium formate, calcium nitrate, sodium silicate, potassium chloride, sodium chloride, ammonium chloride, and combinations thereof.

75. (Cancelled)

76. (Previously presented) The three dimensional printing composition of claim 72, wherein the oil is selected from the group consisting of: oleoyl alcohol, dodecyl alcohol, other aliphatic alcohols, polypropylene glycol, polyethylene glycol, ethers of polyethylene glycol, ethers of polypropylene glycol, mineral oil, fatty esters such as methyl oleate, ethylene glycol octyl/decyl ester; and glycerol tributyrates.

77. (Cancelled)

78. (Previously presented) The three dimensional printing composition of claim 1, wherein the filler comprises up to about 80% by weight of the particulate material.

79. (Currently amended) ~~The particulate material three dimensional printing composition~~ of claim ~~[[78]]1~~, wherein the filler comprises up to about ~~[[40%]]30%~~ by weight of the ~~particulate material composition~~.

80. (Previously presented) The three dimensional printing composition of claim 1, wherein the filler comprises a material selected from the group consisting of starch, glass beads, and a polymer.